# Hungry Canyons Alliance:

## Stream Stabilization in Western Iowa

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# Causes of Streambed Degradation

Highly erodible loess soils

+

Stream straightening and land use changes

=

Higher water velocities

=

Channel downcutting

=

Accelerated stream channel erosion

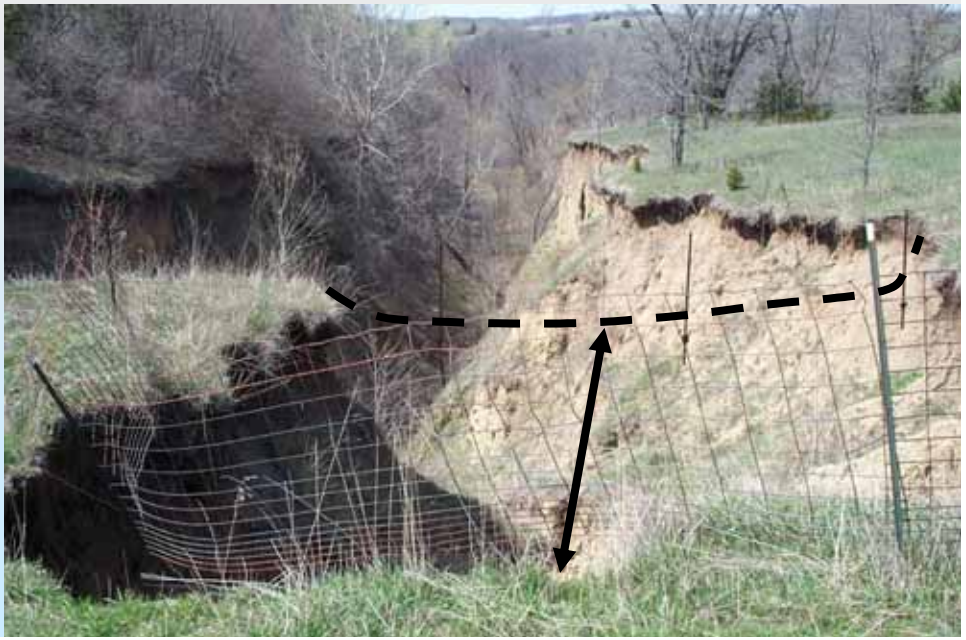
# Streambed Degradation - Knickpoints

**Page County knickpoint: Formed during May 2007 floods; Migrated 314 feet upstream by December 2007; ~5,000 tons of sediment eroded**




## Streambed Degradation – Headcuts, Bank Failure, and Stream Widening

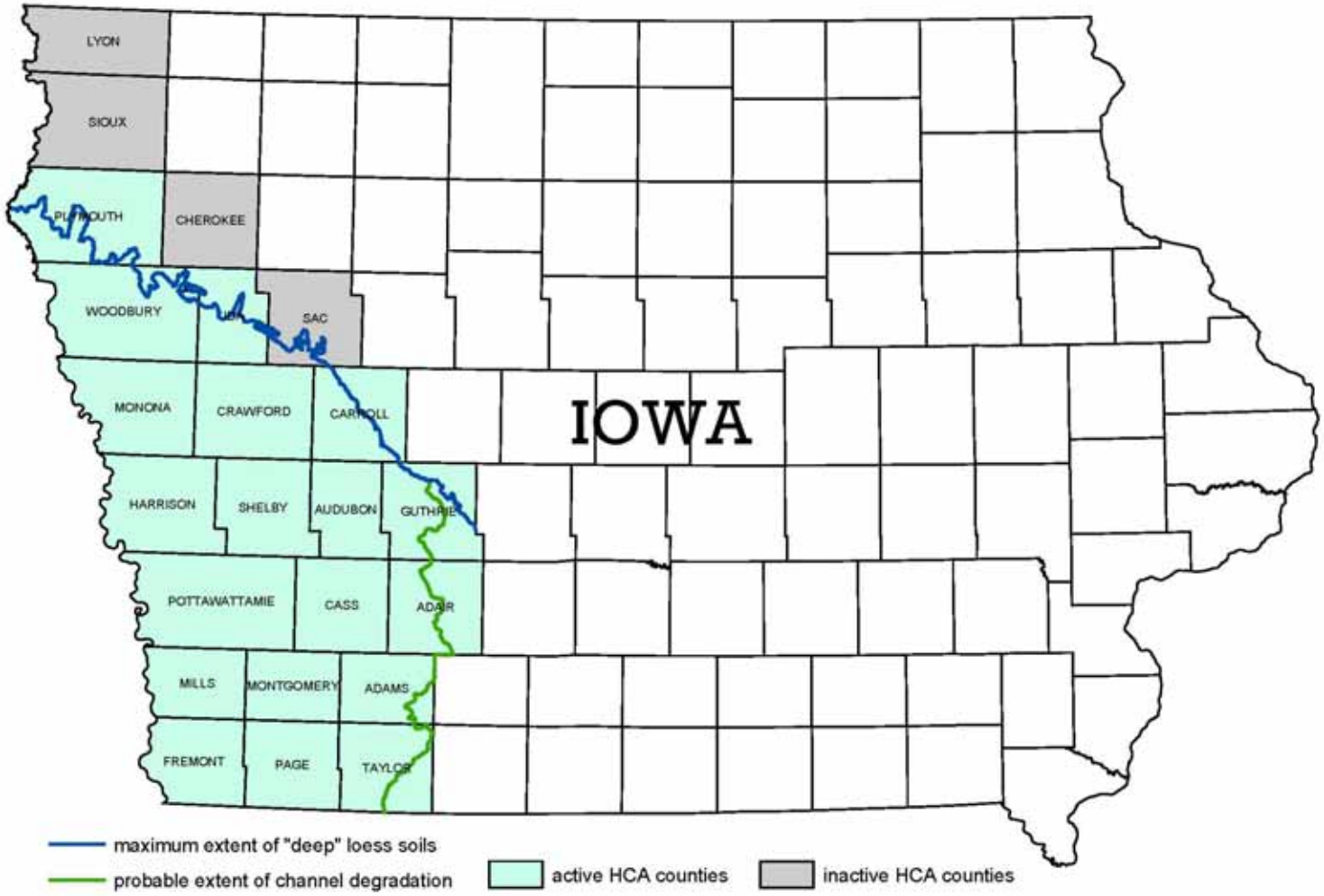
**Gully Growth Rates: 1 Year - Cass County; 5 Years – Fremont County**




**Bridge damage due to streambed degradation**

**Approximate old channel cross section**

## Counties in the Hungry Canyons Alliance



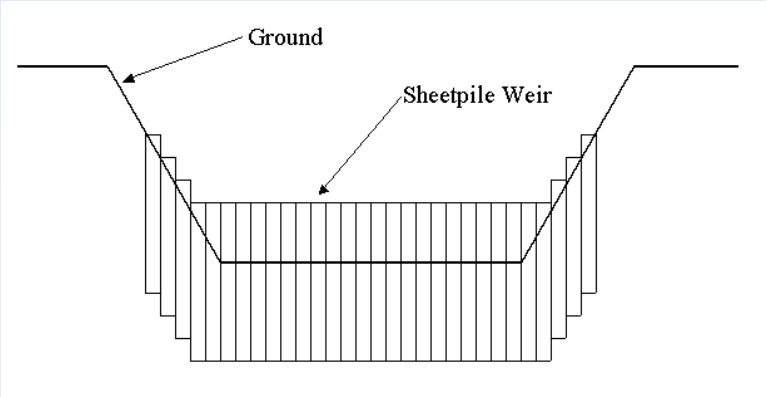

The HCA's purpose is to focus attention on the problems of, and develop solutions related to, stream channel degradation in 23 counties of western Iowa with deep loess soils

# HCA Streambed Stabilization and Watershed Awareness

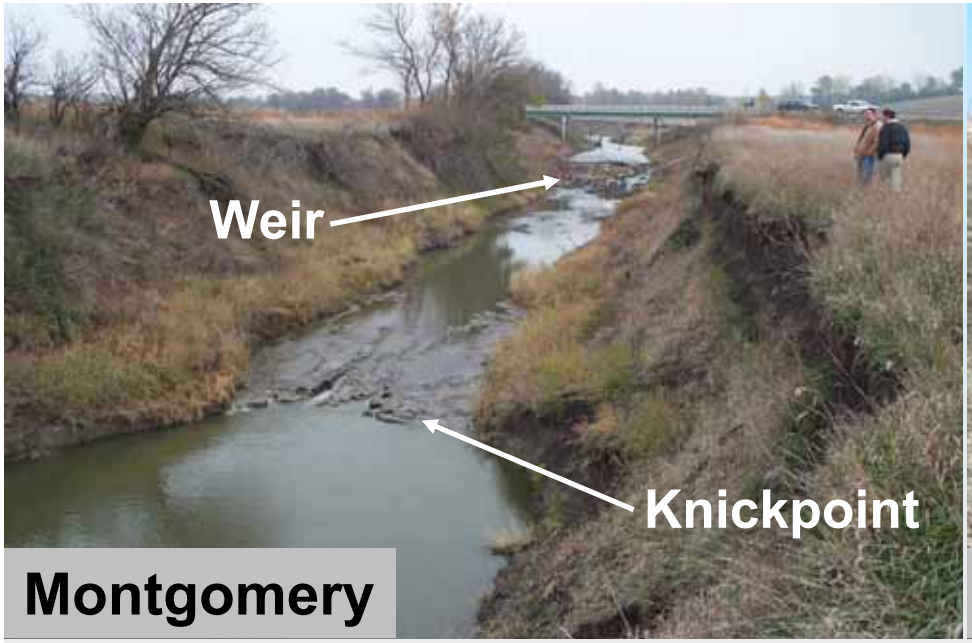

- Streambed stabilization key to preventing erosion & protecting infrastructure
- Knickpoints affect entire watershed as erode upstream
- Structures planned on watershed scale
- Stream videos locate erosion
- Structures at regular intervals change  stream profile from erosive steep incline to stable stair-step pattern
- Site locations planned across political boundaries

# Grade Control Structures

- Raised steel sheet pile weir
- Rip-rap, concrete grout slopes
- Decreases slope of streambed
- Prevents further downcutting




- Creates an upstream backwater condition
  - Sediment settles out upstream
  - Reduces sediment loads
  - Protects bridge pilings





## HCA Grade Control Structures - 350 Total

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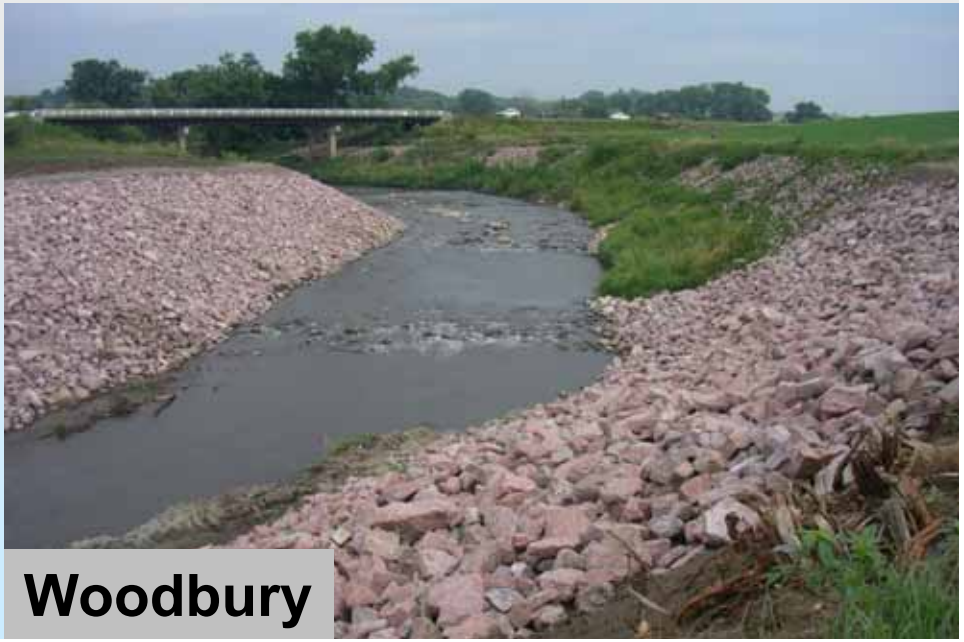

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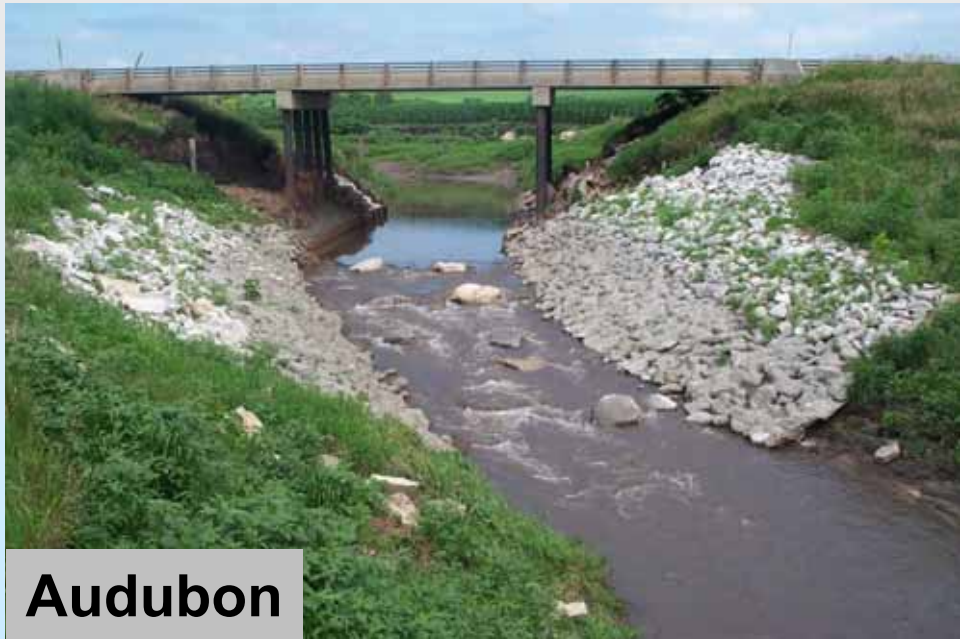
# Fish passage weirs

Montgomery



Audubon

Fremont

Crawford

## Other Types of Grade Control Structures

Plymouth

Pottawattamie

# Northern Natural Gas Pipeline & Structure Protection Project

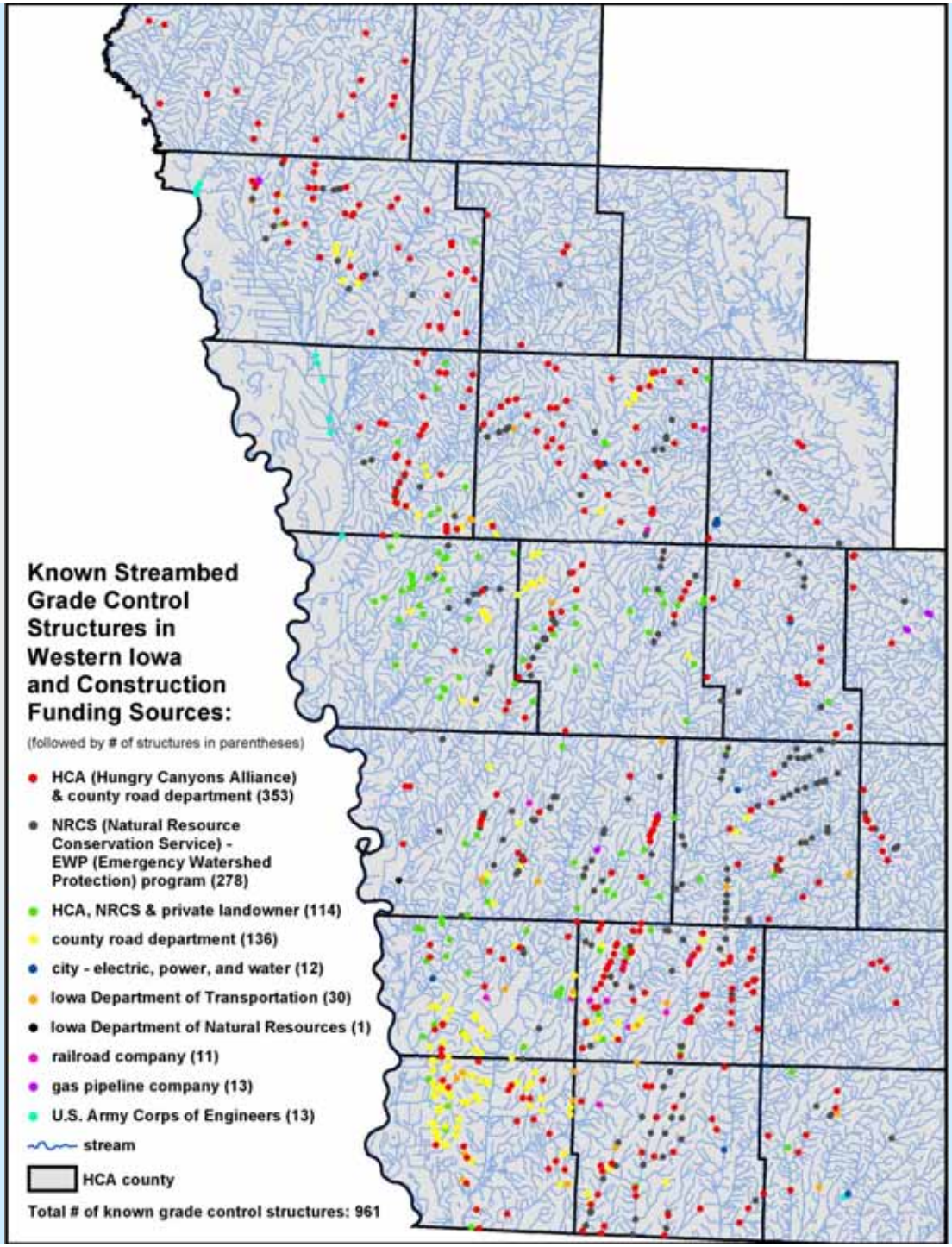
## - Before HCA Involvement



# Northern Natural Gas Pipeline & Structure Protection Project

## -After HCA Involvement




Known Streambed Grade Control Structures in Western Iowa and Construction Funding Sources:
(followed by # of structures in parentheses)
HCA (Hungry Canyons Alliance) & county road department (353)
NRCS (Natural Resource Conservation Service) - EWP (Emergency Watershed Protection) program (278)
HCA, NRCS & private landowner (114)
county road department (136)
city - electric, power, and water (12)
Iowa Department of Transportation (30)
Iowa Department of Natural Resources (1)
railroad company (11)
gas pipeline company (13)
U.S. Army Corps of Engineers (13)
stream
HCA county
Total # of known grade control structures: 961

# Floods of 2007-2008 and EWP Repairs

# Floods of 2007-2008

- Severe rains in 2007 and 2008 (May 2007, June 2008)
  - widespread flooding and stream channel damage
  - worst flooding to hit western Iowa since 1993
- Grade control structures (GCS) directly reduced flood damage costs
  - No damage to infrastructure protected by GCS
  - Vast majority of GCS were undamaged
    - Any damages to GCS minimal compared to potential total loss of infrastructure without GCS
  - Witnessed by:
    - Federal Emergency Management Agency (FEMA)
    - Natural Resources Conservation Service (NRCS)
    - County road departments
  - Fewer claims to FEMA and NRCS-EWP Program

# HCA and NRCS Emergency Watershed Protection (EWP) Program

- 25% local match requirement for NRCS-EWP projects
- Local county governments had budget deficits
- HCA state cost share (at 10%) and county funds (at 15%) to leverage millions of dollars of federal EWP funding (at 75%)
  - $13.22 million total
  - Federal NRCS-EWP = $9.92 million
  - HCA = $1.32 million
  - sponsor counties = $1.98 million
- 71 western Iowa flood repair GCS projects
- Construction completed December 2010
- Job creation for extra construction projects, materials, & heavy equipment at perfect time (approximately 44 jobs)

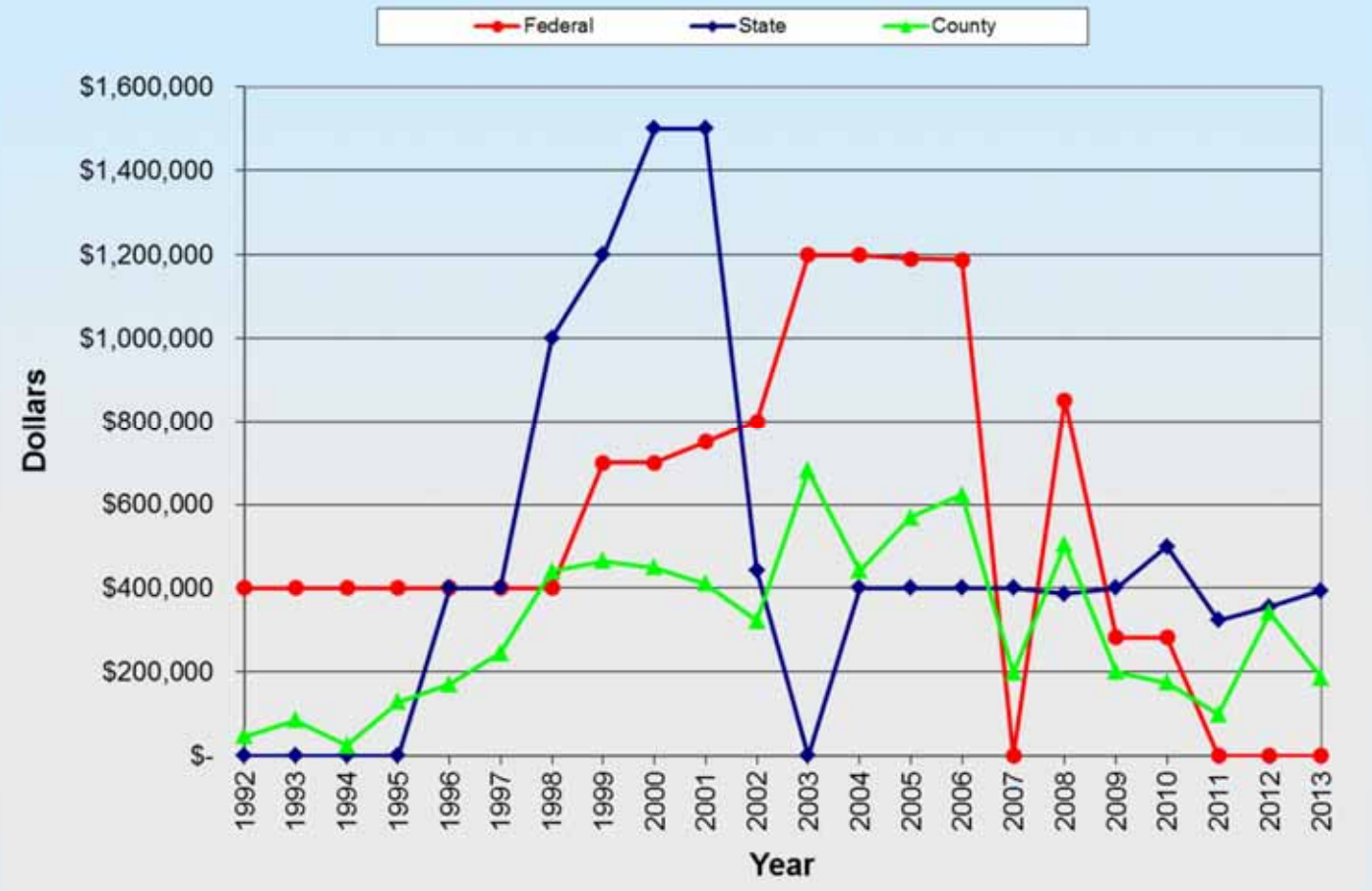
# Benefits of Hungry Canyons Alliance Grade Control Structures

- Since 1992, 360 bridges/culverts protected
- Protection of numerous utility lines (electric, phone, gas, sewer, water)
- Protection of farmland
- Reduced sediment loads and improved water quality (21.6 million tons of sediment protected)

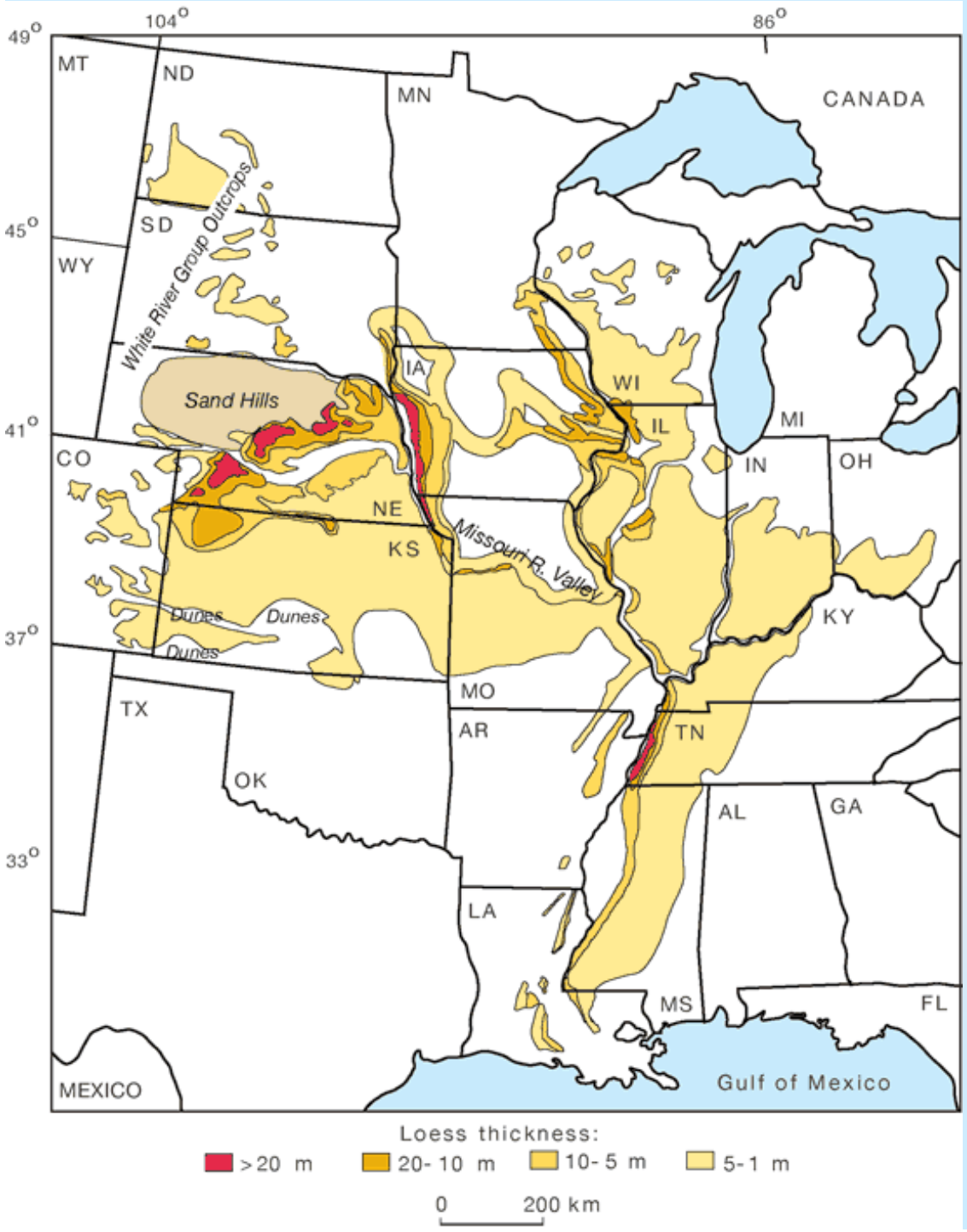
# Benefits of Hungry Canyons Alliance Grade Control Structures

- Prevention of soil movement into Missouri River
- Reduction of the “dead zone” in Gulf of Mexico
- **For every $1 invested in Hungry Canyons Alliance structures, more than $4.20 in property value and 0.99 tons of soil is protected.**

# HCA Funding




- Counties 20% GCS costs
- Counties annual dues $3,000
- State - $400,000/yr since 2002
- Federal - $0 since 2010
  - –was earmark through NRCS – Conservations Operations




- Loess is a very erosive streambed material
- Thicker loess deposits = ↑ potential erosion
- MRV loess deposits reach great enough depth (> 5 m) to cause widespread stream channel downcutting and erosion

# Federal Grade Control Funding

- Void in federal programs/funding for grade-control mitigation projects
  - Small to medium sized streams
    - Army COE – large rivers
    - NRCS – very small drainages
- Proposed by HCA
  - New initiative/program in NRCS
    - Need involvement of other states – not an earmark
    - Provide funding for grade-control projects throughout US in deep loess areas where streams are actively downcutting
    - Funds directed to public entities for mitigation projects

# Costly Problem

# Affordable Solution

**Thank You**

**Any Questions?**

# Contact Information

- For questions or comments about the information discussed in this presentation, contact John Thomas, Hungry Canyons Alliance Project Director
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